Mast 218 Midterm Practice Test

Professor:	*Richard Hall*
Instructions:	*Please answer all 4 questions which carry equal marks. Explain your work clearly.*

1.

(a) Find the equation of the plane PL which contains the three points $A = (1, 0, 1)$, $B = (-1, 2, 5)$, and $C = (5, 1, -1)$.

(b) Find the parametric equation of a line L which passes through the origin and is perpendicular to PL.

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2. Consider the curve given by

$$r(\theta) = 2 + 2\cos\theta, \quad 0 \leq \theta \leq 2\pi.$$

(a) Give a rough sketch.

(b) Calculate the enclosed area.

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3. For the curve

$$r(\theta) = \frac{6}{2 + 6\sin\theta}.$$

(a) Find the eccentricity and the directrix.

(b) Describe the curve and provide a sketch.

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4. Consider the curve given by

$$\boldsymbol{r}(t) = (e^{-t}\cos(t),\, e^{-t}\sin(t),\, 1 - e^{-t}), \quad t \in [0, 2\pi].$$

(a) Find the arc length L of this curve.

(b) Find the points (if any) where the curve is parallel to the z-axis?
